



## Virginia Small Grains Forage Trials, 2023

*Authored by: Caleb Bishop, Research Specialist Senior, School of Plant and Environmental Sciences, Virginia Tech; Greg Lillard, Farm Manager, Northern Piedmont Center School of Plant and Environmental Sciences, Virginia Tech; Jennifer Sheetz, Agricultural Specialist and Manager, Northern Piedmont Center School of Plant and Environmental Sciences, Virginia Tech; Jitender Rathore, Graduate Research Assistant, School of Plant and Environmental Sciences, Virginia Tech; Matthew J. Wright, Research Assistant, School of Plant and Environmental Sciences, Virginia Tech; and Olga S. Walsh, Associate Professor - Grain Crops, Extension Specialist, School of Plant and Environmental Sciences, Virginia Tech.*

### Introduction

A forage production trial of commercial barley, oats, rye, triticale, and wheat cultivars has been conducted yearly since 1994 at the Northern Piedmont Center, Orange. Results from the 2022-23 crop season are presented in this report.

### Season 2022-23

Table 1. Species, cultivars, sources, and seed treatments for each entry participating in the Virginia Small Grains Forage Trials in 2023.

| Entry | Species   | Cultivar           | Source           | Seed treatment                                                                                               |
|-------|-----------|--------------------|------------------|--------------------------------------------------------------------------------------------------------------|
| 1     | Triticale | BCT19004           | Seed-Link Inc.   |                                                                                                              |
| 2     | Triticale | BCT19005           | Seed-Link Inc.   |                                                                                                              |
| 3     | Triticale | BCT19003           | Seed-Link Inc.   |                                                                                                              |
| 4     | Triticale | BCT18002           | Seed-Link Inc.   |                                                                                                              |
| 5     | Wheat     | AGS 3040           | AGSouth Genetics | Albaugh Cereals F&I Custom Blend (Macho® 480, difenoconazole 3L, metalaxyl 265, thiabendazole 4.0, Rizolex®) |
| 6     | Wheat     | AGS 3026           | AGSouth Genetics | Albaugh Cereals F&I Custom Blend (Macho® 480, difenoconazole 3L, metalaxyl 265, thiabendazole 4.0, Rizolex®) |
| 7     | Wheat     | AGS 4043           | AGSouth Genetics | Albaugh Cereals F&I Custom Blend (Macho® 480, difenoconazole 3L, metalaxyl 265, thiabendazole 4.0, Rizolex®) |
| 8     | Barley    | Greg (20211573)    | VCIA             | Foothold Virock, Awaken ST                                                                                   |
| 9     | Barley    | Avalon             | VCIA             | Foothold Virock, Awaken ST                                                                                   |
| 10    | Barley    | Hirondella         | VCIA             | CruiserMaxx Vibrance Cereals and Cruiser 5FS                                                                 |
| 11    | Barley    | Marouetta          | VCIA             | CruiserMaxx Vibrance Cereals and Cruiser 5FS                                                                 |
| 12    | Barley    | VT Beahm           | VCIA             | Foothold Virock, Awaken ST                                                                                   |
| 13    | Barley    | Secretariat        | VCIA             | Tebuconazole, Metalaxyl                                                                                      |
| 14    | Barley    | Flavia             | VCIA             | Foothold Virock, Awaken ST                                                                                   |
| 15    | Rye       | Progas             | KWS              |                                                                                                              |
| 16    | Rye       | Aviator            | KWS              |                                                                                                              |
| 17    | Rye       | SH-05              | KWS              |                                                                                                              |
| 18    | Rye       | SH-06              | KWS              |                                                                                                              |
| 19    | Wheat     | SSI30-06           | Specialty Seed   |                                                                                                              |
| 20    | Triticale | NSTX2208           | Northstar        |                                                                                                              |
| 21    | Triticale | NSTX2207           | Northstar        |                                                                                                              |
| 22    | Triticale | NSTX2206           | Northstar        |                                                                                                              |
| 23    | Triticale | NSTX2205           | Northstar        |                                                                                                              |
| 24    | Triticale | NSTX2204           | Northstar        |                                                                                                              |
| 25    | Triticale | NSTX2203           | Northstar        |                                                                                                              |
| 26    | Triticale | NSTX2202           | Northstar        |                                                                                                              |
| 27    | Triticale | NSTX2201           | Northstar        |                                                                                                              |
| 28    | Barley    | Nomini             | VT               |                                                                                                              |
| 29    | Barley    | VA16BFHB-266 NA-19 | VT               |                                                                                                              |
| 30    | Barley    | VA21BFHB-14 NA     | VT               |                                                                                                              |

### Growing Conditions

The 2022–2023 growing season for Virginia forage producers was highly variable, defined by a mild winter and a spring drought that was later offset by significant summer and fall rainfall. This inconsistent weather led to a mix of forage production results across the state. Fall planting and early season growing conditions were good with adequate soil moisture in most fields. Winter was mostly mild, with minimal freeze damage. Hot and dry conditions in the spring of 2023 were challenging. This caused slow pasture growth and forced an earlier-than-normal first cutting of hay. Disease pressure was minimal in most small grains' fields, with several reports of

fungal diseases. The dry spell was followed by heavy rainfall during the summer and fall. This helped improve pasture growth that had been suppressed by the spring drought. However, the increased rainfall also created difficulties for harvesting later cuttings of hay, causing delays and affecting the quality of the final product. Later in season, especially in late June and early July, difficult weather conditions in parts of the state have affected harvest timeliness. Grain quality was negatively impacted, with sprouting and lower test weight values noted for several fields. Many growers achieved an above-average to near-record yields.

## Management Practices

Pre-plant fertilizer was applied during the first week of October 2022 as 30-100-30-10S-1B, at the rate of 350 lb per acre. Plots were planted on October 19, 2022, and were seven 7-inch rows wide by 16 feet long, trimmed to 9 feet for harvest. Nitrogen, as UAN, was applied at a rate of 40 lb of N per acre on February 15, 2023, and at the rate of 60 lb of N per acre on March 16, 2023. For weed control, Quelex was applied on March 1, 2023, at the rate of 0.75 oz per acre. All plots were targeted for harvest when each entry reached the boot stage (GS 45-50), and the average growth stage was 47 at the time of harvest. Two rows, the entire length of the plots, were harvested with a 12-inch Jari sickle-bar mower and weighed with an electronic hanging scale.

## Results

Results are reported in Table 2 for:

**35% DM Yield** - refers to silage yield at 35% dry matter (65% moisture). This moisture level helps to improve packing during harvest, leading to better fermentation quality and palatability for cattle.

**DM Yield** - Total amount of dry matter produced per acre, and nutritive value for all crops:

**CP** - Crude Protein content, a key indicator of silage overall nutritional value. The CP percentage, derived from the total nitrogen content, reflects both true protein and non-protein nitrogen sources like ammonia. Higher CP levels indicate better nutrition by enhancing rumen function, bacterial protein synthesis, and overall feed efficiency, which can boost milk production and growth. Lower CP may lead to reduced feed intake, weight loss, and lower milk production, requires dietary adjustment.

**ADF** - Acid Detergent Fiber, measures the least digestible fiber components of silage (cellulose and lignin). Higher ADF values indicate lower energy content and reduced digestibility for livestock. Lower ADF percentages signify more digestible, higher-energy silage, more desirable for animal nutrition

**NDF** - Neutral Detergent Fiber, refers to the fiber content of silage, and is crucial for ruminal health. Higher NDF indicates a higher proportion of less digestible fiber components like cellulose, hemicellulose, and lignin, which can limit dry matter intake and energy availability for livestock. Lower NDF can negatively impact dairy cow rumen health and milk production by increasing gut fill, reducing rumination time, and decreasing pH.

**TDN** - Total Digestible Nutrients content of silage, a measure of its energy value, representing the sum of its digestible protein, fiber, fat, and carbohydrates. Higher TDN indicate higher energy density and nutritional quality. Lower TDN indicates low energy concentration and higher fiber content.

Experimental plots vary in yield and other measurements due to their location in the field and other factors which cannot be controlled. The statistics given in the table are intended to help the reader make valid comparisons between cultivars. The magnitude of differences which may have been due to experimental error has been computed for the data and listed at the bottom of columns as the LSD (.05) (least significant difference with 95% confidence). Differences must be greater than LSD to be believed to truly exist.

Forage yield, over all entries in 2023, ranged from 2.04 to 3.90 tons per acre. The 2023 yield 2.80 tons per acre, compared to forage yield of 1.6 tons per acre in 2022. Plant height ranged from 25 to 42 inches in 2023. Crude protein ranged from 14.08 to 18.58%. In 2023, crude protein was 16.3%, compared to 14.4% in previous year. TDN values ranged from 63.8 to 69.9% in 2023. While triticale cultivar BCT19003 had the highest forage yield, and barley cultivar Secretariat – the lowest, rye species (across cultivars) yielded the best in 2023, with average forage yield of 3.37 tons per acre.

Table 2. Small Grain Forage Variety Test, Northern Piedmont AREC, Orange, VA, 2022-23, boot stage harvest.

| Species         | Cultivar           | Source                          | Harvest Date | Zadok | Height, in  | CP, %       | ADF, %      | NDF, %      | TDN, %      | 35% DM Yield, tons/a | DM Yield, tons/a |
|-----------------|--------------------|---------------------------------|--------------|-------|-------------|-------------|-------------|-------------|-------------|----------------------|------------------|
| Triticale       | BCT19003           | Seed-Link Inc                   | 20-Apr       | 45    | 39.0        | 14.8        | 34.3        | 57.6        | 63.8        | 11.14                | 3.90             |
| Rye             | SH-06              | KWS                             | 6-Apr        | 50    | 36.3        | 15.6        | 30.3        | 56.8        | 66.6        | 10.90                | 3.81             |
| Rye             | Progas             | KWS                             | 13-Apr       | 45    | 36.8        | 16.9        | 32.7        | 58.2        | 65.0        | 10.64                | 3.73             |
| Barley          | Avalon             | VT                              | 13-Apr       | 45    | 32.3        | 16.4        | 30.6        | 54.6        | 66.4        | 10.44                | 3.66             |
| Barley          | Flavia             | Elsoms Ackermann Barley Limited | 13-Apr       | 45    | 28.3        | 15.7        | 31.8        | 54.6        | 65.6        | 9.50                 | 3.32             |
| Rye             | SH-05              | KWS                             | 5-Apr        | 50    | 33.0        | 16.6        | 29.6        | 54.0        | 67.1        | 9.47                 | 3.31             |
| Triticale       | BCT19005           | Seed-Link Inc                   | 20-Apr       | 49    | 34.5        | 16.4        | 30.9        | 55.8        | 66.2        | 8.51                 | 2.98             |
| Triticale       | BCT18002           | Seed-Link Inc                   | 20-Apr       | 45    | 42.3        | 15.0        | 33.8        | 58.3        | 64.1        | 8.35                 | 2.92             |
| Barley          | Nomini             | VT                              | 5-Apr        | 45    | 26.5        | 18.6        | 27.7        | 47.0        | 68.4        | 8.33                 | 2.92             |
| Barley          | VT Beahm           | VT                              | 5-Apr        | 45    | 28.0        | 17.4        | 29.8        | 50.1        | 67.0        | 8.24                 | 2.88             |
| Barley          | Hirondella         | Elsoms Ackermann Barley Limited | 13-Apr       | 45    | 32.5        | 16.1        | 29.8        | 53.6        | 67.0        | 8.16                 | 2.86             |
| Triticale       | NSTX2203           | Northern Star Seed LLC          | 17-Apr       | 45    | 32.3        | 15.8        | 30.2        | 54.4        | 66.7        | 7.83                 | 2.74             |
| Barley          | VA21BFHB-14 NA     | VT                              | 10-Apr       | 45    | 31.0        | 17.8        | 29.2        | 51.4        | 67.4        | 7.73                 | 2.71             |
| Triticale       | NSTX2204           | Northern Star Seed LLC          | 17-Apr       | 45    | 32.8        | 15.4        | 32.2        | 55.8        | 65.3        | 7.72                 | 2.70             |
| Wheat           | SSI30-06           | Specialty Seed, Inc             | 17-Apr       | 49    | 25.0        | 17.8        | 25.7        | 50.4        | 69.9        | 7.63                 | 2.67             |
| Triticale       | NSTX2201           | Northern Star Seed LLC          | 17-Apr       | 57    | 31.0        | 17.3        | 29.8        | 52.8        | 67.0        | 7.59                 | 2.66             |
| Barley          | Marouetta          | Ackermann (VCIA)                | 14-Apr       | 50    | 31.5        | 14.1        | 32.9        | 52.1        | 64.8        | 7.57                 | 2.65             |
| Triticale       | NSTX2206           | Northern Agri-Brands            | 20-Apr       | 45    | 30.5        | 15.5        | 30.9        | 54.0        | 66.2        | 7.54                 | 2.64             |
| Rye             | Aviator            | KWS                             | 14-Apr       | 49    | 37.0        | 15.7        | 34.4        | 57.4        | 63.7        | 7.53                 | 2.63             |
| Barley          | Greg (20211573)    | VT                              | 13-Apr       | 45    | 31.8        | 14.7        | 31.5        | 56.1        | 65.8        | 7.49                 | 2.62             |
| Triticale       | BCT19004           | Seed-Link Inc                   | 14-Apr       | 45    | 30.5        | 14.6        | 33.6        | 54.5        | 64.4        | 7.31                 | 2.56             |
| Triticale       | NSTX2208           | Northern Star Seed LLC          | 17-Apr       | 49    | 32.8        | 17.2        | 27.7        | 52.0        | 68.4        | 7.18                 | 2.51             |
| Barley          | VA16BFHB-266 NA-19 | VT                              | 7-Apr        | 45    | 32.8        | 18.0        | 30.9        | 55.3        | 66.2        | 7.08                 | 2.48             |
| Triticale       | NSTX2207           | Northern Star Seed LLC          | 17-Apr       | 49    | 30.0        | 16.0        | 30.0        | 52.9        | 66.9        | 6.98                 | 2.44             |
| Wheat           | AGS 3040           | AGSouth Genetics                | 17-Apr       | 49    | 26.8        | 18.0        | 25.9        | 49.6        | 69.7        | 6.88                 | 2.41             |
| Triticale       | NSTX2205           | Northern Star Seed LLC          | 14-Apr       | 45    | 29.3        | 15.3        | 33.3        | 54.3        | 64.5        | 6.82                 | 2.39             |
| Triticale       | NSTX2202           | Northern Star Seed LLC          | 17-Apr       | 45    | 32.8        | 17.3        | 30.3        | 54.7        | 66.6        | 6.37                 | 2.23             |
| Wheat           | AGS 3026           | AGSouth Genetics                | 20-Apr       | 45    | 28.3        | 16.4        | 27.1        | 53.6        | 68.9        | 6.36                 | 2.23             |
| Wheat           | AGS 4043           | AGSouth Genetics                | 20-Apr       | 53    | 25.8        | 16.6        | 29.8        | 55.5        | 66.9        | 6.31                 | 2.21             |
| Barley          | Secretariat        | VT                              | 7-Apr        | 49    | 28.8        | 17.8        | 27.3        | 49.7        | 68.7        | 5.84                 | 2.04             |
| <b>Mean</b>     |                    |                                 |              |       | <b>31.7</b> | <b>16.3</b> | <b>30.5</b> | <b>53.9</b> | <b>66.5</b> | <b>7.98</b>          | <b>2.79</b>      |
| <b>CV</b>       |                    |                                 |              |       | <b>4.7</b>  | <b>11.0</b> | <b>6.0</b>  | <b>4.2</b>  | <b>1.9</b>  | <b>17.64</b>         | <b>17.64</b>     |
| <b>LSD 0.05</b> |                    |                                 |              |       | <b>2.1</b>  | <b>2.5</b>  | <b>2.6</b>  | <b>3.2</b>  | <b>1.8</b>  | <b>2.15</b>          | <b>0.75</b>      |

CP - Crude Protein content; ADF - Acid Detergent Fiber; NDF - Neutral Detergent Fiber; TDN - Total Digestible Nutrients; 35% DM Yield - silage yield at 35% dry matter; DM Yield - dry matter produced per acre.

## Participating Companies

**Seed-Link Inc.**, 208 St. David Street, Lindsay, Ontario K9V 4Z4.

**AGSouth Genetics**, PO BOX 398, Newton, GA 39870.

**KWS**, 5705 W Old Shakopee Rd, Ste 110, Minneapolis, MN 55437.

**Specialty Seed Inc.**, 132 Ferry Road, Anguilla, MS 38721.

**Northern Star Seed LLC.**, 1403 N County Road 700 W, Frankfort, IN 46041.

**Elsoms Ackermann Barley Limited**, Albert Warehouse, Pinchbeck Road, Spalding, Lincolnshire, England, PE11 1QG.

**Virginia Tech** and **Virginia Crop Improvement Association** (VT and VCIA), 9142 Atlee Station Road, Mechanicsville, VA 23111.

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